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Biological Effects of Radiation Damage in *Drosophila*

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Objectives:

- Analyze the genetic effects of radiation *Drosophila melanogaster*
- Describe phenotypic changes as a result of radiation damage.

Research Question:

What is your hypothesis for the phenotypic and genotypic results of crossing the selected traits? What are the visible effects (physical, behavioral) of radiation on *Drosophila*?

Discussion Questions:

1. What is your hypothesis for the results of crossbreeding the selected traits?
2. What phenotypes and phenotypic ratio do you predict for the F1 generation?
3. What genotypes and genotypic ratio do you predict for the F1 generation?
4. What are the expected results if the F1 generation were allowed to breed?
5. Model effects of radiation with crossbreeding of known strains of *Drosophila*.
6. Demonstrate or predict examples of genetic/phenotypic variations as a result of cross breeding *Drosophila* with different traits.
7. Compare and contrast images and video of *Drosophila* that have been exposed to radiation with flies that are normal.

Materials:

1. *Drosophila melanogaster* of two different strains (e.g., wild-type and wingless)
2. Record book to record your findings
3. Materials to cultivate specimens (containers, food)
4. Magnifying glass or dissection microscope
5. Fly sorting materials (sorting brushes, anesthetizing tools,)

Directions:

1. Select the specific *Drosophila melanogaster* traits to be crossbred. This will require some research. Mate the flies obtained for the experiment. After five days, remove the adult flies from the container (only eggs and larva will remain in the container).
2. Observe and record the development of the larvae over the next ten days.
3. Observe the F1 generation and record the characteristics of the adults as they emerge. When enough adults have hatched to provide a good sample, remove the adults to a new container.

4. Anesthetize the adult flies (using a method that is safe for your classroom) and sort them according to the visible phenotypic traits. Record the results of your observations. Analyze the results of your crossing the two traits.

(**Note:** Equipment and materials for this activity are also commercially available from various educational resources.)

References:

Flies In Space: <http://quest.nasa.gov/projects/flies/>

FlyBase: <http://flybase.bio.indiana.edu/>

Flight Experiment: http://lis.arc.nasa.gov/lis/Hardware_App/Drosophila.html